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Outreach to Underserved Communities in Northern Nigeria, 2012–2013

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Abstract

Background.—Persistent wild poliovirus transmission in Nigeria constitutes a major obstacle to global polio eradication. In August 2012, the Nigerian national polio program implemented a strategy to conduct outreach to underserved communities within the context of the country’s polio emergency action plans.

Methods.—A standard operating procedure (SOP) for outreach to underserved communities was developed and included in the national guidelines for management of supplemental immunization activities (SIAs). The SOP included the following key elements: (1) community engagement meetings, (2) training of field teams, (3) field work, and (4) acute flaccid paralysis surveillance.

Results.—Of the 46 437 settlements visited and enumerated during the outreach activities, 8607 (19%) reported that vaccination teams did not visit their settlements during prior SIAs, and 5112 (11.0%) reported never having been visited by polio vaccination teams. Fifty-two percent of enumerated settlements (23 944) were not found in the existing microplan used for the immediate past SIAs.

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Conclusions.—During a year of outreach to >45 000 scattered, nomadic, and border settlements, approximately 1 in 5 identified were missed in the immediately preceding SIAs. These missed settlements housed a large number of previously unvaccinated children and potentially served as reservoirs for persistent wild poliovirus transmission in Nigeria.

Keywords

polio; wild poliovirus; eradication; underserved populations; nomad; settlement

In 2012, the World Health Assembly declared the eradication of polio to be a programmatic emergency for global public health, with polio remaining endemic only in Nigeria, Pakistan, and Afghanistan [1–4]. In Nigeria, persistent wild poliovirus (WPV) transmission constitutes a risk factor for WPV reintroduction in polio-free countries and is an obstacle to global polio eradication [5]. While Nigeria has conducted dozens of supplemental immunization activities (SIAs) in the last few years and has improved their quality, a recent review estimates that <65% of children have received 4 doses of oral poliovirus vaccine (OPV) in 4 northern Nigerian states at very high risk for polio (Borno, Kano, Sokoto, and Yobe) [6].

In January 2012, the Government of Nigeria implemented a national emergency action plan with an accountability framework to eradicate poliovirus [7]. A national emergency operations center was activated in October 2012 to lead the national response. A major element of the plan was to improve SIA quality and to expand their reach to previously underserved communities that were isolated from immunization services because of operational and sociocultural factors [7]. These underserved populations included nomadic Fulani pastoralist groups, migrant farmers and fishermen, and inhabitants of scattered, border, and other hard-to-reach settlements.

Before 2012, microplans for polio SIAs in most local government areas (LGAs) did not typically include migrant and mobile populations or scattered settlements. Typically, scattered settlements were considered covered by vaccination teams assigned to cover the larger and more populous areas most proximal to the underserved communities. Other settlements far from populous areas were often completely unaccounted for in the immunization microplan settlement list. In 2005, for instance, a study of the Fulani nomadic tribes in the northern state of Borno reported that 99% of the children younger than 5 years had not received any polio or routine immunization vaccines (so-called 0-dose children) [8]. The resultant low population immunity among these underserved populations contributed to the ongoing transmission of WPV in Nigeria. For instance, of the 112 cases of WPV infection with a date of onset in 2012, 80% resided within or in proximity to underserved populations [9]. In addition to low vaccination coverage, surveillance for children with acute flaccid paralysis (AFP) among underserved populations in Nigeria has been suboptimal for many years. Children with AFP in these communities have limited access to health care; anecdotal data suggested that AFP cases were often unreported due to cultural, geographical, and logistical constraints in accessing healthcare services.

In March 2012, after being free of polio for 3 years, a case of WPV was confirmed in Niger state within a nomadic community, providing evidence that these communities could

serve as mobile reservoirs to sustain WPV transmission and spread WPV into previously uninfected areas. In response, the national polio program developed an outreach strategy for underserved communities. This article summarizes the evolving strategy to reach these communities and its impact on the progress of the national polio program.

METHODS

Outreach Strategy

A standard operating procedure for community outreach was developed on the basis of field experience and was included in the national guidelines for management of SIAs. The standard operating procedure included the following key elements.

Definitions and Other Data Elements—Settlements were defined as a household or collection of households within a well-defined geographical boundary and with a recognizable leader. A missed settlement was defined as any settlement that was not visited by the SIA vaccination teams during the immediate past SIA or any settlement that had never been visited by vaccination teams. A household was defined as a group of individuals who ate from the same cooking pot, and a 0-dose child was defined as a child who had never received a dose of OPV.

Community Engagement Meetings—Before outreach activities, the district immunization and primary healthcare team hosts a planning meeting with local religious, traditional, nomadic, and village leaders from the remote settlements. Other participants include veterinary officers and district officials who routinely provide other animal and human health services to these communities. Leaders from the underserved settlements are requested to provide a line list of all settlements and population estimates in the local area where they reside. This list is harmonized with the settlement list used by the district to plan SIAs. The harmonized list includes all known nomadic, scattered, and border settlements, with estimates of the population of children aged <5 years in each settlement.

Training of Field Teams—The harmonized settlement list is used for planning visits to all settlements during the upcoming SIAs. Local leaders provide the names of local guides, who assist teams in locating the remote settlements. Field teams are constituted to include the local guides and a vaccinator/data collector. One team is assigned to each subdistrict (or ward) where underserved settlements are reported to exist. The data collectors and field guides receive training on how to conduct a settlement census, methods for vaccine and cold chain management, techniques for vaccinating children aged <5 years, how to conduct active case searches for children with AFP, methods for recording global positioning system (GPS) coordinates, and techniques to prompt enumerated households to assist with locating additional settlements not originally included in the harmonized district settlement list.

Field Work—To overcome logistic difficulties associated with reaching remote locations, operational funds were provided to secure hires of cars, motorcycles, canoes, or other appropriate means of transportation, as needed. Plans were made with district vaccine and cold chain officers to provide vaccines, vaccine carriers, and ice packs on a daily basis during the SIA. On the basis of the harmonized settlement list and vaccination teams'

daily work plan, field teams visit known and newly discovered underserved settlements, enumerate all children <5 years old, check their left fifth finger for evidence of recent OPV vaccination (which is signaled by marking the finger with indelible ink), vaccinate any child with no finger marking, and obtain GPS coordinates of the settlement. At the end of each day, unused vaccine is returned, a report is provided to the head of the subdistrict (ward focal person), and arrangements are made for picking up vaccine on the following day. In remote, very-hard-to-reach areas, teams may remain in the field overnight to complete their activities the following day. Generally, field work is completed during the 4 days of the SIA but may extend if the census is incomplete.

AFP Case Search—The field teams query the heads of each household and village leaders to determine whether there are any children <15 years of age who had onset of paralysis in the prior 6 months. The teams use the World Health Organization (WHO) case definition for AFP [10]. Teams use posters as a visual aid to illustrate AFP cases. When an AFP case is found, demographic data and date of onset of paralysis are collected. Suspect AFP cases identified during the enumeration are compared to AFP cases on the LGA AFP line list. Unreported AFP cases were defined as AFP cases that were identified during enumeration but were not on the LGA AFP line list. Such AFP cases are reported to the district disease surveillance and notification officer for further investigation and follow-up, using the standard WHO protocol.

Data Management and Analysis—A predesigned paper-based settlement enumeration tool is used to capture all data elements before entry into an Epi Info database (Centers for Disease Control and Prevention, Atlanta, GA). Updated copies of the settlement line lists are given to the district or LGA polio eradication team during the debrief meeting; these are used to update future SIA microplans, to ensure inclusion of identified settlements in future campaigns. Teams use Android-based mobile devices to obtain the GPS coordinates of all settlements. Uploaded GPS data are linked to survey forms and used to create maps, using the Arc GIS software.

All data are aggregated and summarized at the local government, state, and national levels. Univariate data analysis was performed to obtain frequencies, sums, proportions, and means, using Epi Info, version 3.4.3, and Excel (Microsoft, Seattle, WA).

Selection of Districts or LGAs for Outreach Activities—Initially, the program selected districts on the basis of a risk profile for high nomadic populations. The risk profile was developed using a landscape analysis based on the length of livestock routes and enrollment in nomadic schools [11]. Over time, this analysis was updated with additional input from state officials and supplementary information on the presence of resources for nomadic communities, such as the total acreage of grazing reserves, the total length of stock routes, and the number of schools for children in nomadic communities; evidence of declining population immunity to polio; and the occurrence of confirmed WPV outbreaks within the preceding 6 months. On the basis of data analysis from initial outreach exercises, which suggested that a large proportion of 0-dose children <5 years old and unreported AFP cases resided along interdistrict, interstate, and international borders, the February and

March 2013 outreach risk profile analyses gave additional weights to border districts, LGAs, and settlements.

Ethical Considerations

The underserved settlement enumeration and outreach exercise was approved as a nonresearch programmatic activity by the National Polio Emergency Operations Center. All field activities were conducted with the consensus of community leaders and settlement heads. Permission to vaccinate children during field work was obtained from the parents (or caregivers) of such children.

RESULTS

During August 2012–July 2013, field teams conducted outreach activities to 253 LGAs in 19 states and enumerated children aged <5 years in 525 959 households in 46 437 settlements (Table 1, Figure 1). Of the 35 954 settlements with available data on the settlement type, 32 261 (90%) were inhabited by the nomadic Fulani tribes. The average number of households per settlement was small (median, 5.0 households/settlement; mean, 12.0 households/settlement) and ranged from 1 to 297 households/settlement. There were 1 056 800 children aged <5 years residing in these settlements, with an average of 2 children/household. Compared with the entire population aged <5 years residing in the outreach LGAs, the mean and median percentages of children aged <5 years enumerated during outreach in underserved settlements in these LGAs were 13.1% and 9.9%, respectively.

Of the 46 437 settlements visited during the outreach, 8607 (19%) reported that vaccination teams did not visit their settlements during the preceding SIAs, whereas 5112 (11.0%) reported they had never been visited by polio vaccination teams (Table 1). Of the 46 437 settlements enumerated, 23 944 (52%) were not found in the existing microplan used for the immediate past SIAs. In addition, 16 648 (36%) were not mentioned by the community leaders during the settlement harmonization meeting. Of the settlements that were identified by field teams, 13 992 (30.1%) were neither in the microplan nor mentioned by the community leaders.

Population figures obtained during the outreach showed that 1 056 800 children aged <5 years resided within the outreach settlements (Table 2). Of these, 58 074 (6%) resided in settlements that had never been visited by vaccination teams, and 63 850 had never received any prior doses of OPV (Figure 2). Compared with children in settlements where polio vaccination teams had visited, children in never-visited settlements tended to reside in communities along district and interstate borders.

Field teams found 216 unreported AFP cases with onset of paralysis within the preceding 6 months. Most of the AFP cases were detected in outreach exercises conducted during October–December 2012, corresponding to the interval of peak WPV case counts across the country. AFP cases tended to cluster in selected districts, and, within districts, they tended to cluster in selected subdistricts (wards). Of the 253 districts enumerated, 129 had no AFP cases, 45 had 1 case, 19 had 2 cases, and 23 had 3 cases. Similarly, among the 2228 wards where enumeration was conducted, 0 cases were detected in 2070 wards, 1 case was

detected in 130, 2 cases were detected in 17, and 3 were detected in 11. Therefore, there appeared to be nonrandom clustering of 0-dose children with unreported suspected AFP cases (Figure 2).

DISCUSSION

Outreach efforts targeted at nomadic and underserved populations are a powerful tool to define populations in need of health services. Described here are efforts to enumerate 46 437 settlements and vaccinate children that had no previous access to immunization services. Over a 12-month period of outreach to scattered, nomadic, and border settlements, we found that almost 1 in 5 enumerated settlements were missed in the immediately preceding SIAs by vaccination teams and that about half of these missed settlements had never been visited by vaccination teams during Immunization Plus Days. These missed settlements hosted a large number of 0-dose children and could serve as a reservoir for persistent WPV transmission. The majority of settlements were inhabited by Fulani nomadic tribal populations.

During the first round of outreach, in August 2012, teams found a higher proportion of missed settlements. However, this proportion declined in the next 2 outreach rounds. Immediately after the August 2012 round, the national polio program and partner agencies (notably the WHO) embraced and adopted this outreach strategy to reach the underserved populations during the SIAs. Subsequently, the Nigerian polio program implemented the standard operating procedure for these activities in other LGAs at high risk for polio. These efforts substantially reduced the proportion of missed settlements identified by enumeration teams during the November and December 2012 exercises. In 2013, during the February and March SIA rounds, field teams visited LGAs where the risk of polio was previously low and where outreach had not been supported. In these newly visited settlements, the proportion of missed settlements increased to a level similar to what was observed in August 2012.

Some settlements continued to be missed even after their area was enumerated for the first time. This may be related to the challenge of concurrently running the Immunization Plus Days while looking for missed settlements. During the outreach, identification of settlements that were neither in the existing microplans nor mentioned by the community leaders suggests that these settlements were previously unknown to both the community leaders and the immunization teams and were identified solely through the special effort of the field teams. We recognize that it is difficult for vaccination teams, who are following a daily work plan based on a line list of settlements, to spend additional time looking for new settlements. This finding underscores the need for regular special efforts to look for new settlements as part of the microplanning process, not only for polio immunization campaigns but also for other primary care services.

Although the provision of primary care services was not the focus of the outreach, the outreach exercises identified many communities with no access to routine infant and childhood immunization and other primary care services. Key factors identified as responsible for lack of access included inadequate microplanning, limited resources for logistic support, and lack of engagement of community leaders in the microplanning

process. It is pertinent, therefore, to address these factors in ongoing efforts to improve the access of underserved populations to routine immunization services throughout Nigeria. Through the field work, we identified several microplanning best practices, including extensive review of existing microplans, settlement harmonization meetings with the community leaders, and frequent walk-through exercises to identify new settlements. These best practices can be adopted by immunization and other programs to ensure proper planning for underserved populations. In addition, district health staff can build upon the community engagement strategies to help plan for future outreach activities and to help link these communities with a primary care clinic. The outreach activities also raised the awareness of clinic staff regarding the existence of these chronically missed communities within their catchment areas. Finally, the engagement of local officers in efforts to reach these communities provides a pool of readily available manpower that could be mobilized promptly to respond to various health issues in these communities.

Furthermore, the finding of clusters of unreported suspected AFP cases in some LGAs and wards during the outreach exercises suggests that the current surveillance system needs to identify surveillance focal points within these communities. A key constraint of the outreach efforts was the limited follow-up information on suspected cases; hence, we could not confirm that they were true AFP cases and had appropriate case investigations conducted. In the example of Kankara LGA in Katsina state, where information is available on the AFP cases, only 1 of 13 cases had stool samples collected. Most of the other cases had onset of illness >2 weeks (14 days) before the exercise, and contrary to standard standard operating procedures, stool specimens were not collected. The geographic clustering of cases in LGAs like Kankara and the peak in AFP case counts that corresponded to the peak in WPV case counts of the national program both suggest that some of the suspect AFP cases may have been caused by WPV. In addition to the confirmed WPV case in Kankara, there were 3 epidemiologically linked cases among underserved communities in the same ward/sub-district. WPV genetic diversity (reflected by the number of genetic clusters) is used to assess both viral diversity and surveillance sensitivity [12]. Genetic divergence equaling 1.5% (VP1 nucleotide identity) from previously identified cases indicates undetected circulation of so-called orphan virus for >1 year [13]. For several years, Nigeria has detected a high proportion of orphan viruses despite the surveillance system attaining relatively good surveillance indicators [13]. Of the 51 WPV cases detected as of November 2013, the program identified 8 orphan WPVs. Together, these findings suggest that these missed settlements might indeed constitute hidden reservoirs of WPV. Because of their highly mobile lifestyle, nomadic populations are capable of spreading the virus throughout the country and need to be included in the national program if eradication is to be achieved. The findings of these exercises underscore the need for the national program to strengthen AFP surveillance in these underserved communities. To address the surveillance gaps, the national program is currently developing a strategy to strengthen surveillance in underserved communities, using the network of community leaders as informants.

Lessons learned from the outreach exercises include the significant human and material resources needed to conduct these walk-through outreach activities. These exercises are labor intensive and expensive and will require additional funding for sustainability. However, given the outcomes from the exercises and the urgency of the polio eradication efforts,

the program is supporting continued efforts to expand these outreach activities to other unreached settlements. The initial outreach focused mostly on nomadic Fulani settlements. Future efforts should identify and conduct similar outreach activities among migrant fishermen, migrant farmers, and other underserved populations.

We also observed the advantage of leveraging available local resources and derived robust operational support from the veterinary health workers. Because of their long-term well-established relationship with the nomads, veterinary health workers were trusted among the nomads, and they facilitated the community engagement meetings, assisted with the search for nomadic settlements, provided appropriate linkages with the nomadic populations, and assisted in vaccinating nomadic children.

Finally, the community engagement meetings were one of the key thrusts of the outreach activities and afforded the community leaders an unprecedented opportunity to participate in the planning for polio SIAs. It is also serving as a platform for sustained involvement of these leaders in the planning and implementation of healthcare-related services in their settlements. Their awareness of available health services at the LGA level is expected to increase the community demand for these services.

The outreach exercises described here found that very large numbers of communities were missed during polio immunization activities. Improved microplans and added field teams based on this work have expanded access to previously underserved populations that were likely contributing to the continued transmission of WPV in Nigeria. The national polio program now routinely uses outreach exercises to prioritize LGAs and wards for special SIA rounds. Continued enumeration and vaccination of unimmunized populations will be needed to reach the population immunity levels necessary to interrupt WPV transmission in Nigeria.

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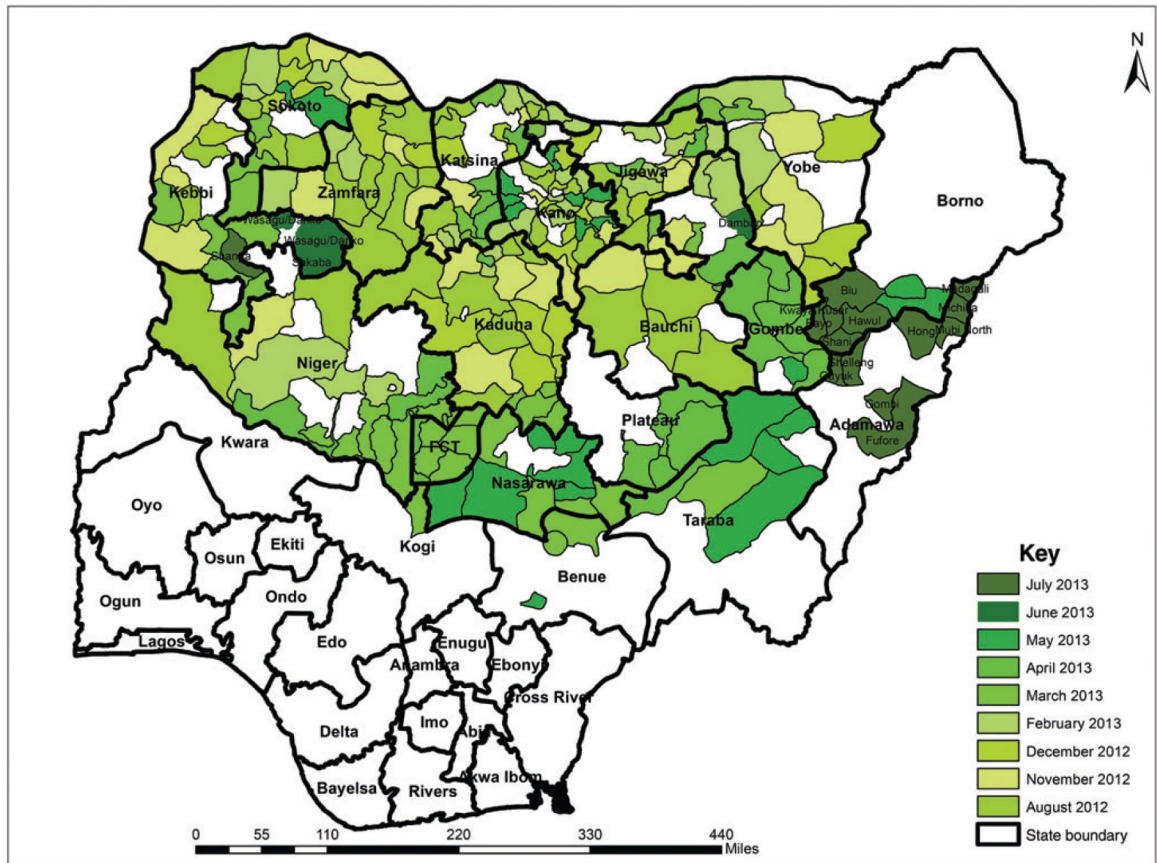


Figure 1. Geographical location of high-priority local government areas where field outreach activities were conducted, Northern Nigeria, August 2012 to July 2013.

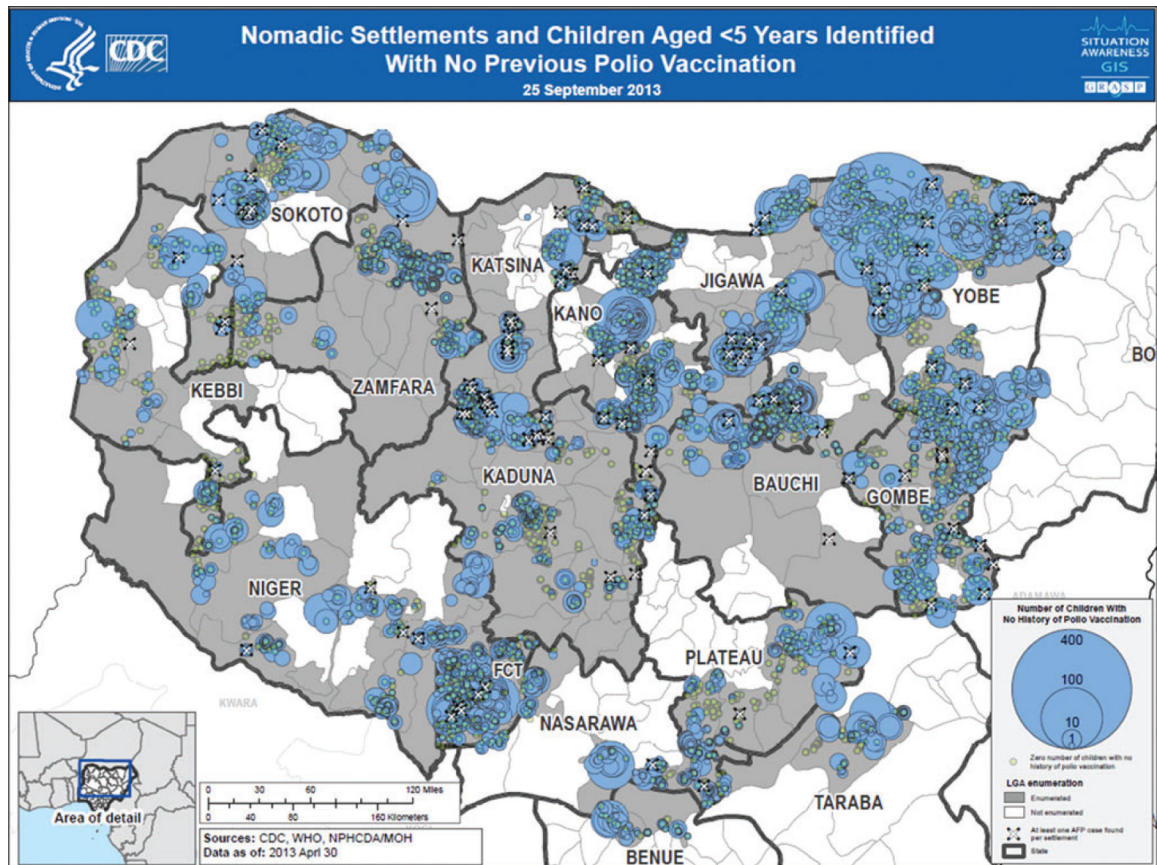


Figure 2. Geographical distribution of suspected cases of acute flaccid paralysis (AFP) and children who received no polio or routine immunization vaccines identified during field outreach, Northern Nigeria, August 2012 to July 2013.

Table 1. Summary of Aggregated Outreach Settlement Data, by Outreach Period, Northern Nigeria, August 2012–July 2013

| Outreach Period | LGAs, No. | States, No. | Enumerated Settlements During Current Outreach, No. | Settlements Missed by Vaccination Teams During Immediate Prior IPD, No. (%) | Settlements Never Visited by Vaccination Teams in Any Past IPDs, No. (%) |
|-----------------|-----------|-----------------|---|---|--|
| August 2012 | 41 | 10 | 10 329 | 2698 (26.1) | 1578 (15.3) |
| November 2012 | 29 | 10 | 9575 | 1723 (18.0) | 848 (8.9) |
| December 2012 | 25 | 8 | 5145 | 402 (7.8) | 232 (4.5) |
| February 2013 | 37 | 10 | 5072 | 885 (17.4) | 662 (13.1) |
| March 2013 | 40 | 12 | 5833 | 1212 (20.8) | 844 (14.5) |
| April 2013 | 37 | 10 | 4258 | 717 (16.8) | 467 (11.0) |
| May 2013 | 27 | 6 | 4673 | 871 (18.6) | 417 (8.9) |
| June 2013 | 3 | 2 | 497 | 39 (7.8) | 22 (4.4) |
| July 2013 | 14 | 3 | 1055 | 60 (5.7) | 42 (4.0) |
| Overall | 253 | 19 ^a | 46 437 | 8607 (18.5) | 5112 (11.0) |

Abbreviations: LGA, local government area; IPD, Immunization Plus Day.

^aThis is not a sum of all the rows in the column because outreach was conducted to different LGAs in the same state at different times.

Table 2.

Population Characteristics of Polio Vaccine-Eligible Children and Unreported Cases of Acute Flaccid Paralysis (AFP) in Outreach Settlements, by Outreach Period, Northern Nigeria, August 2012–July 2013

| Outreach Period | Identified During Current Enumeration Outreach | In Settlements Missed by Vaccination Teams During Immediate Prior IPD | In Never-Visited Settlements | Received 0 Doses ^a | Previously Unreported AFP Cases Identified, No. |
|-----------------|--|---|------------------------------|-------------------------------|---|
| August 2012 | 223 663 | 29 652 (13.3) | 15 207 (6.8) | 7839 | 9 |
| November 2012 | 205 100 | 20 301 (9.9) | 9685 (4.7) | 14 123 | 66 |
| December 2012 | 173 166 | 5777 (3.3) | 3353 (1.9) | 9360 | 34 |
| February 2013 | 103 573 | 13 549 (13.1) | 7612 (7.3) | 6304 | 65 |
| March 2013 | 101 633 | 12 318 (12.1) | 8718 (8.6) | 9615 | 18 |
| April 2013 | 99 066 | 8012 (8.1) | 5684 (5.7) | 6497 | 19 |
| May 2013 | 81 520 | 10 124 (12.4) | 4723 (5.8) | 8331 | 5 |
| June 2013 | 18 270 | 395 (2.2) | 202 (1.1) | 363 | 0 |
| July 2013 | 50 809 | 2907 (5.7) | 2890 (5.7) | 1418 | 0 |
| Overall | 1 056 800 | 103 035 (9.7) | 58 074 (5.5) | 63 850 | 216 |

Data are no. or no. (%) of children aged <5 years, unless otherwise indicated.

Abbreviation: IPD, Immunization Plus Day.

^aChildren who received no polio or routine immunization vaccines.